

Internal Cylindrical Production Grinding Machine



S120 – The quick and nimble
for small bores.

The Art of Grinding.



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The quick and nimble CNC Internal Cylindrical Production Grinding Machine for small and large series production.

The S120 is a compact internal grinding machine with a cross-slide design for up to two internal grinding spindles. The machine enables productive machining of components with an external diameter of up to 50 mm and is suitable for both small series operations as well as for use in production systems. The wide range of internal grinding spindles and special internal grinding assemblies provides the ideal basis for modular configurability.

Efficient and reliable programming of grinding and dressing cycles for every user thanks to the unique Studer grinding Software with pictogramming and micro functions as well as programming software StuderGRIND for special applications. The systematic development, production, assembly and testing of our products are carried out in a process-oriented manner in strict compliance with the VDA 6.4 and ISO 9001 directives.





Advantages:

S120 – Dimensions

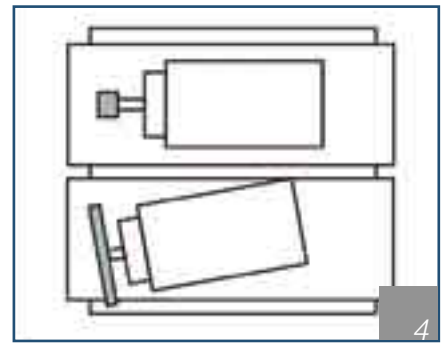
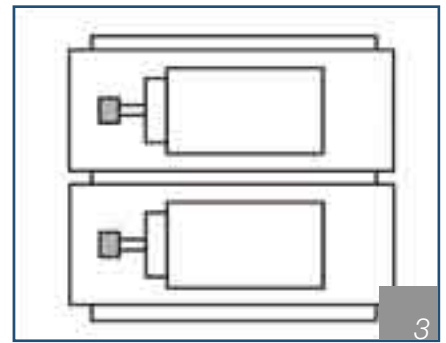
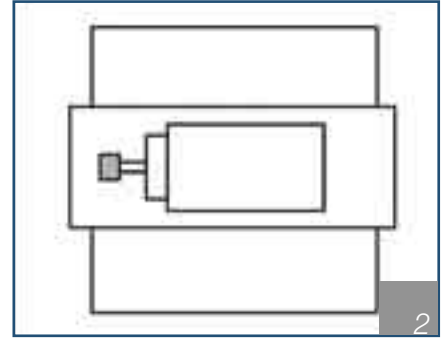
- Centre height 125 mm (4.9")
- Swing 130 mm (5.1")

Hardware

- Cross-slide for 1 or 2 grinding spindles
- C axis for the workhead
- Large selection of multi-application spindles
- Easy to automate
- Compact design
- Extensive wheel dressing possibilities
- Full enclosure with sliding door
- Granitan S103 mineral-cast machine base
- Extensive range of chucks and accessories

Software

- Extremely easy programming with Studer Pictogramming
- Programming software StuderGRIND for creating grinding and dressing programs on the PC
- Standardised interfaces for loader and peripheral devices



Grinding spindle holder

The modular grinding spindle holder concept enables optimum adaptation for all grinding tasks.

One internal, two internal or one Internal and one external grinding spindle with a diameter of 100 (3.9") or 120 mm (4.7") and a speed range of up to 120 000 rpm can be configured with various spindle holders in an optimum manner for many machining applications.

The spindles may be equipped individually with the tried-and-tested arbor deflection compensation. This allows high-precision machining, especially for the smallest arbor diameters.

1 Machine room

2-4 Spindle holder configurations

- Modular system
- Arbor deflection compensation



Workhead

The workhead features rigidly designed high-precision roller bearings which absorb loads of up to 100 Nm (74 ft lbs) and guarantees roundness a precision of less than 0.0004 mm (0.000,016"). The optional fine adjustment on the workhead enables cylindricity corrections to be carried out directly via the control.

The integrated ring sensor (optional) guarantees reliable wheel contact detection even with small diameters. Downtimes are reduced to a minimum and process safety enhanced. Adaptation to the different grinding wheels and materials is carried out via control parameters.

We are all aware of the importance of clamping devices. Equipment specifically adapted to the workpiece and handling devices ensure reliable and precisely defined clamping.

Q axis

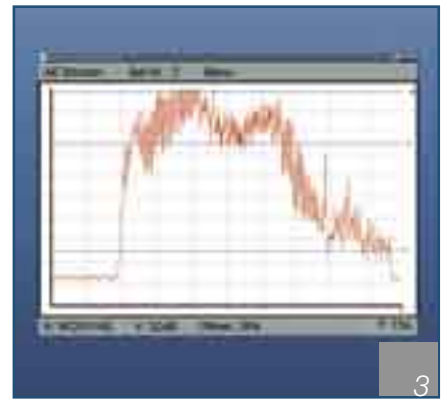
Automatic Q axis with a swivel angle of -5 to $+30$ deg and resolution of 0.0001 deg. The automatic swivel makes it possible to grind a cylinder and various high-precision tapers in one clamping.

1 Workhead

2 Fine adjustment for cylindricity corrections

3 Roundness

- Pneumatic lift
- Low maintenance
- High roundness values



Sensor technology

Studer attaches great importance to optimised grinding processes. Sensor technology plays a big part in this regard, especially in the internal grinding process. The main objectives pursued in this respect are:

- Air-gap elimination to reduce cycle time
- Process monitoring during grinding and dressing
- Easy setup of the grinding wheel and workpiece

In the case of small bore diameters, it is particularly difficult to receive a signal that can be evaluated. Studer achieves the best result with a ring sensor consisting of a revolving transmitter ring and a fixed receiver ring. Signal transmission between the rings is contactless.

1 Ring sensor

2 Evaluation unit

3 Signal curve

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- Air-gap elimination
 - Process safety
 - Setup assistance
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Dressing

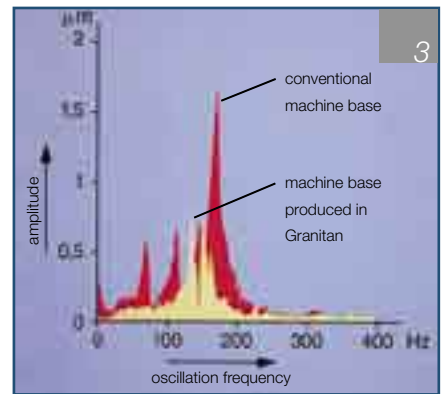
The large number of dressing combinations enables the machine to be ideally adapted to the most varied applications and workpiece requirements. In addition to the fixed dressing devices, other devices can also be fitted to suit rotating dressing tools. These are especially suitable for dressing vitrified bonded CBN grinding wheels. Combined with acoustic touch sensor technology, a precisely defined, minimal amount can be dressed using the Touch-Dressing CBN method. In this way, grinding wheel loss is reduced, with sufficient pore space retained for the removal of grinding chips.

1 *Diamond dressing wheel*

2 *Fixed dresser*

3 *Chuck dressing ring*

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- Integrierte Sensorik
 - Touch-Dressing
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Granitan mineral-casting S103 machine base

The material structure developed by Studer and which has proved its superb efficiency over many years is produced in the company's own plant using the most modern industrial techniques.

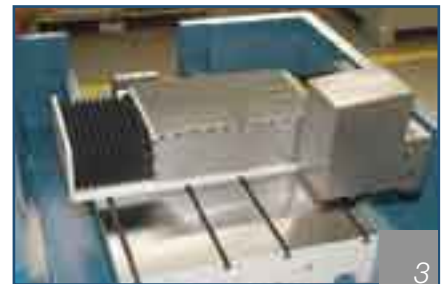
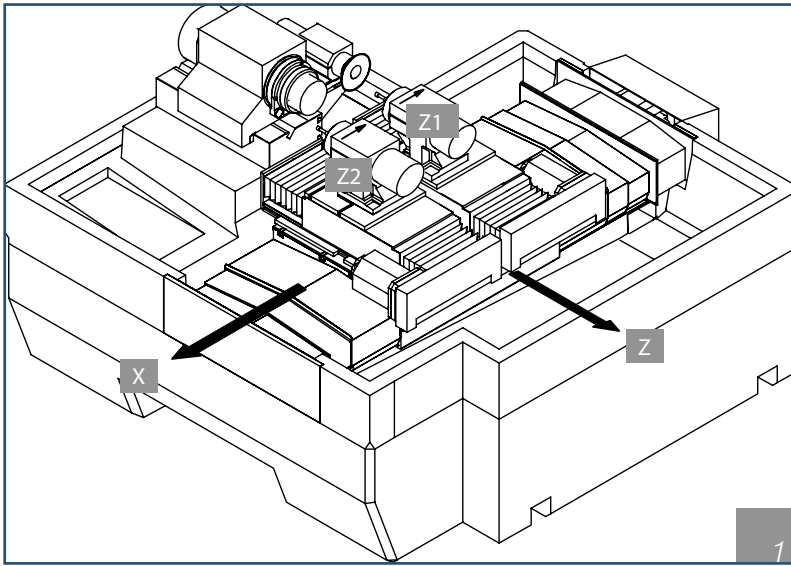
- The excellent damping behaviour has a positive effect on the surface quality of the ground parts. The service life of the grinding wheel is increased, leading to reduced downtimes.
- Temporary temperature fluctuations are extensively compensated for by the favourable thermal behaviour of Granitan, resulting in high dimensional accuracy at all times.
- The V and flat guideways for the cross slide are moulded directly into the machine base and are provided with a non-abrasive Granitan S200 slide-way coating. The slip-stick effect observed on conventional guideways or even the common floating of slides are eliminated by the patented knobbed structure of the guideways. The highest possible accuracy is achieved through the entire speed range with high load capacity and cushioning levels. The robust and maintenance-free design ensures that excellent guideway properties are maintained over a virtually indefinite service life.

1 Machine base with X and Z guideways

2 Knobbed guideways made of Granitan S200

3 Vibration characteristics of Granitan compared to cast iron

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- Vibration-damping
-
- Thermal stability
-
- Non-wearing
-



X and Z axes

The cross slide (X axis) is made of high-quality grey cast iron. The ground V and flat guideways are permanently in contact with the machine bed. The slide feed is achieved by a 40 mm (1.57") diameter recirculating ball screw, connected to the three-phase servo motor via a torsion-proof bellow-type coupling.

One or two Z axes are mounted on the cross slide according to requirements.

Each Z axis forms a self-enclosed unit which can be equipped with an internal grinding spindle, optional arbor deflection compensation or an external grinding unit. In the basic model, the Z axis is fitted with an anti-friction linear guideway. A hydrostatic guideway is available as an option. The spindle holders can be moved in the X and Z direction and be secured according to requirements.

1 X and Z axis configuration

2 X axis

3 Z axis

- Large guideway interval of the X axis
- Hydrostatic Z axis (optional)



Machine control and operation

The Fanuc 21i-TB with an active 10.4" flat colour screen can be used as the control unit for most grinding jobs, including thread grinding. For additional applications, such as high accuracy form grinding, the Fanuc 16i-TB is used. The control units are extremely reliable and optimally tuned to the drive elements. The control cabinet is bolted to the machine bed at the rear of the machine and contains separate power and control compartments. The layout of the elements complies with the relevant safety norms and is EMV-tested.

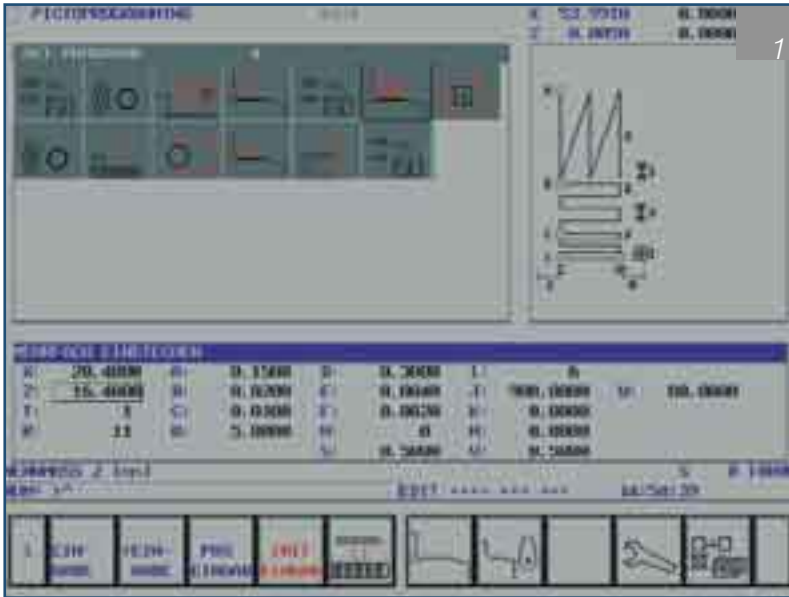
The controls are arranged clearly and ergonomically. The PCU – process control unit – enables setup close to the grinding process. The Sensitron electronic air-gap bridging device reduces downtimes to a minimum.

1 Machine control with accessories such as the Sensitron air-gap bridging device, balancing device and external measurement controls

2 PCU – process control unit

3 Internal view of the control cabinet

- PCU manual control
- Control cabinet EMV-tested
- Ergonomically arranged controls



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Programming

The outstanding mechanical engineering concept of the S120 is completed by the grinding software designed by Studer's software engineers and optimised by users.

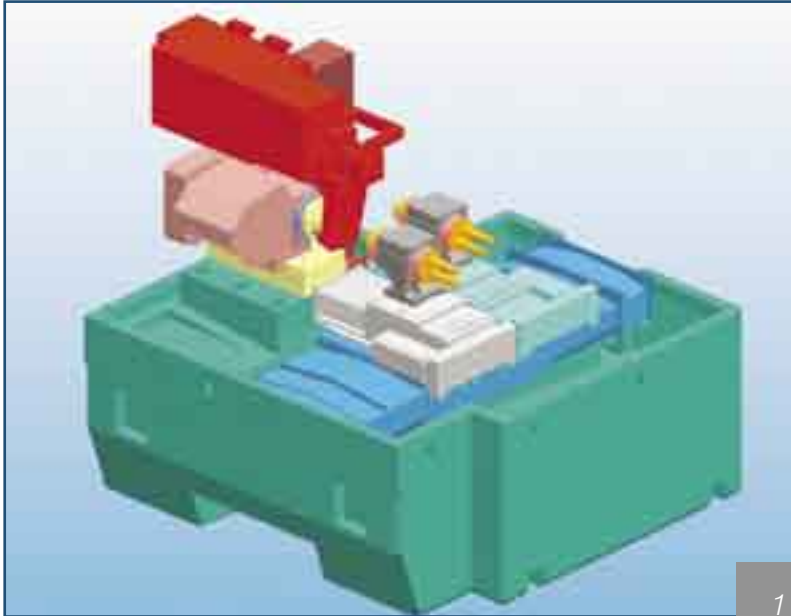
- Pictogramming: sequencing individual grinding cycles – the control unit generates the ISO Code.
- Microfunctions: free programming of grinding and dressing process sequences – optimisation of the grinding process.
- StuderGRIND software for special applications such as form and thread grinding and profiling the grinding wheel for complex workpiece forms – programs are created on a PC and transferred directly to the machine control unit.

1 Pictogramming

2 Microfunctions

3 Programming software StuderGRIND

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- Modern technology
 - Pictogramming
 - Programming software StuderGRIND



Our complete process-optimised solutions guarantee greater efficiency and reliability throughout.

Handling systems: the loading systems can be subjected to modular adaptation depending on the use of the machine and the machining process. The corresponding peripherals ensure optimum integration into the production processes. The handling systems communicate via the standardised loader interface and can even assist solving complex handling processes as well as the handling of measuring results.

Quality control during the grinding process: in-process, post-process, recording, evaluation and correction. This type of quality assurance gains importance during grinding but especially match grinding.

For medium-size and small series, Studer offers integrated loader systems to increase efficiency and flexibility. These integrated loaders can be reset extremely quickly and have the advantage of being controlled by the machine control.



1 Customised system machine

2 Workspace

3 Post-process measuring station

- Automatic production processes
- Integrated quality control
- Standardised loader interfaces



Accessories and services

There is an extensive range of accessory equipment available for all Studer cylindrical grinding machines, including centres, dressing tools, grinding wheels, clamping devices, internal grinding spindles, in-process gauging devices, etc.

Our Training Department organises courses for hundreds of customers every year specialising in programming and machine use – a recipe for success in using your machine to the optimum. Machine maintenance courses take account of the specific needs of operational maintenance departments. On request, we can also run training courses on the customer's premises or make our specialists available to resolve particular grinding problems.

Our After Sales Service speaks your language. Our service engineers are active around the globe and are based in your vicinity. A well thought-out range of services is available to you after purchase to enable you to exploit your machine to the full. Spare parts can be delivered up to 10 years after conclusion of the machine range.

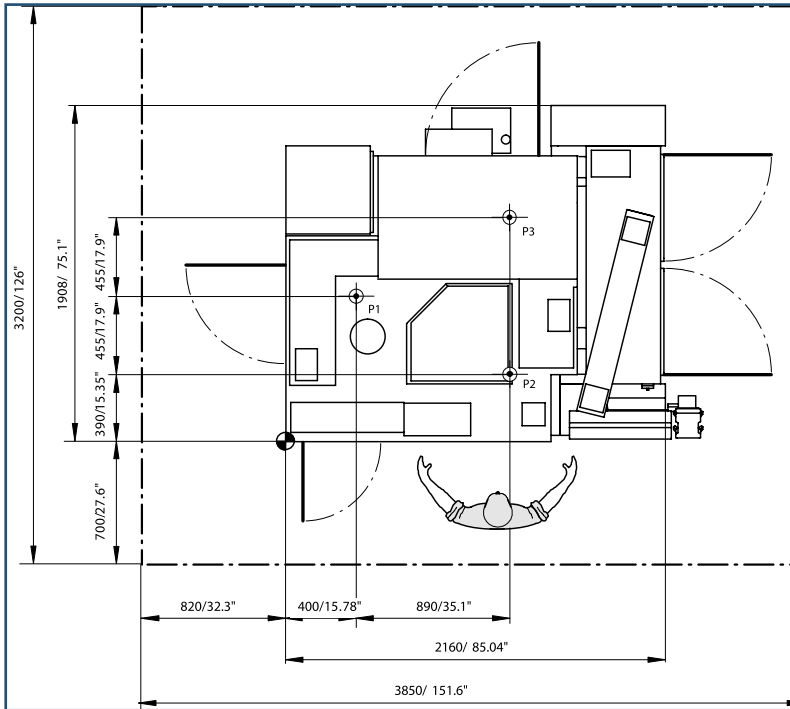
1 Teleservice

2 Deployment of engineers on the customer's premises

3 Operating worldwide

4 Training on simulators

- Commissioning
- Training
- Production support
- Warranty extension
- Maintenance
- HelpLine
- Repair
- Spare parts
- Teleservice
- Inspection
- Overhaul



Main dimensions

Centre height	125 mm (4.9")
Swing	130 mm (5.1")

Transverse axis (X)

Max. travel	300 mm (11.8")
Max. speed	20 000 mm/min (787 ipm)
Resolution	0,0001 mm (0.000,004")
Distance to guideways	280 mm (10.9")

Longitudinal axis (Z)

Max. travel	180 mm (7.1")
Max. speed	15 000 mm/min (590 ipm)
Resolution	0,0001 mm (0.000,004")
Guideways	rollerbearing/hydrostatic (Option)

Grinding spindle holder

Spindle assembly	parallel
Max. number of spindles	2
Spindle pick-up	dia. 100 mm (3.9")/ dia. 120 mm (4.7")
Spindle speeds – internal grinding	up to 120 000 rpm
Spindle speeds – external grinding	7 000 rpm

Workhead

Speed range	1–1 500 rpm
Fitting taper	MK4/ dia. 70 mm (2.75")
Spindle feedthrough	dia. 26 mm (1")
Drive power	2,8 kW (3.8 hp)
Load during live grinding	100 Nm (74 ft lbs)
Roundness accuracy	0,0004/0,0002 mm (0.000,016"/0.000,008")
C axis standard, indirect measuring system	0,0001 deg

Q axis (Option)

Swivel range automatic	–5 deg to +30 deg
Resolution	0,0001 deg

Dressing

Fixed dresser	MK1 shortend
Rotating dressing spindle	dia. 50/72 mm (1.97"/2.84")

Control unit

Fanuc 21i-TB	
Fanuc 16i-TB (Option)	

Connected loads

Total connected load	43 kVA
Air pressure	5.5 bar (80 psi)
Total weight	5 100 kg (11 220 lbs)

The information given is based on the technical levels of our machine at the time of this brochure going to print. We reserve the right to further develop our machines technically and make design modifications. This means that the dimensions, weights, colours, etc. of the machines supplied can differ. The diverse application possibilities of our machines depend on the technical equipment specifically requested by our customers. The equipment specifically agreed with the customer is therefore exclusively definitive for the equipping of the machines, and not any general data, information or illustrations.



Fritz Studer AG
CH-3602 Thun
Telephone +41-33-439 11 11
Fax +41-33-439 11 12
www.studerag.com



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